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A review of myrmecophilous mites of the family Microdispidae (Acari, Heterostigmatina) of Western Siberia

Alexander A. Khaustov[1]

1 *Tyumen State University, Tyumen, Russia*

Corresponding author: *Alexander A. Khaustov* (alkhaustov@mail.ru)

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Abstract

Five species of myrmecophilous microdispid mites (Acari: Microdispidae) are recorded from Western Siberia, Russia. *Unguidispus lasii* Kurosa, 1979, *U. japonicus* Kurosa, 1979, *Caesarodispus minutus* (Sevastianov, 1981), and *C. samsinaki* (Mahunka, 1967), **comb. n.** are reported from Russia for the first time. *Unguidispus polyctenus* (Sevastianov, 1969) and *Caesarodispus samsinaki* are redescribed. The keys to species of the genera *Unguidispus* Mahunka, 1970 and *Caesarodispus* Mahunka, 1977 are provided.

Keywords

Acari, Heterostigmatina, systematics, phoresy, ants, Western Siberia

Introduction

The family Microdispidae Cross, 1965 (Acari: Pygmephoroidea) includes 18 genera and about 115 described species (Hajiqanbar and Hosseininaveh 2014). All representatives from the genera *Unguidispus* Mahunka, 1970, *Caesarodispus* Mahunka, 1977, *Myrmecodispus* Cross, 1965, *Reductodispus* Mahunka, 1977, *Perperipes* Cross, 1965, and *Glyphidomastax* Cross, 1965 are associated with various ants (Hymenoptera: Formicidae) (Hajiqanbar and Hosseininaveh 2014). Most of microdispid mites are

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fungivorous, but the species from the genera *Perperipes* and *Glyphidomastax*, associated with army ants, probably feed on their larvae and/or eggs (Kaliszewski et al. 1995). During the study of myrmecophilous mites of Western Siberia we found five species of the family Microdispidae belonging to the genera *Unguidispus* Mahunka, 1970 and *Caesarodispus* Mahunka, 1977. The main goal of this paper is to redescribe the poorly known species *Unguidispus polyctenus* (Sevastianov, 1969) and *Caesarodispus samsinaki* (Mahunka, 1967), comb. n. and provide new records of myrmecophilous microdispid mites from Western Siberia, as well as the keys to world species of the genera *Unguidispus* and *Caesarodispus*.

Materials and methods

Mites were collected from ants or ant nests and mounted in Hoyer's medium. The terminology of idiosoma and legs follows Lindquist (1986); the nomenclature of subcapitular setae and the designation of cheliceral setae follow Grandjean (1944, 1947), respectively. The system of Pygmephoroidea follows Khaustov (2004, 2008). All measurements are given in micrometers (μm). For leg chaetotaxy the number of solenidia is given in parentheses. The studied material is deposited in the mite collection of the Tyumen State University Museum of Zoology, Tyumen, Russia. SEM photographs were made with the aid of JEOL–JSM-6510LV SEM microscope.

Systematics

Family Microdispidae Cross, 1965

Genus *Unguidispus* Mahunka, 1970

Type species. *Unguidispus stammeri* Mahunka, 1970, by original designation.

Diagnosis. Female. Gnathosoma dorsally with 2 pairs of setae. Pharyngeal pumps 1 and 3 vestigial, pharyngeal pump 2 large, transversely striated. Prodorsum usually almost completely covered by tergite C. Cupules *ia* and *ih* small, round. Two pairs of pseudanal setae present (ps_2 absent). Posterior margin of posterior sternal plate entire. Leg I distinctly shorter than leg II. Tibiotarsus with well-developed claw; eupathidia *tc'-tc"* situated on clear pinnaculum; setae *s* of tibiotarsus I present. Trochanter IV anterodorsally with short spine-like process.

The genus *Unguidispus* currently includes six species distributed in the Palaearctic region: *U. stammeri*, *U. polyctenus* (Sevastianov, 1969), *U. contematosus* Sevastianov, 1981, *U. okumurai* Kurosa, 1979, *U. japonicus* Kurosa, 1979, and *U. lasii* Kurosa, 1979. All species of the genus *Unguidispus* phoretic on ants of the genera *Formica* L. and *Lasius* Fabricius (Hymenoptera: Formicinae), or inhabit their nests (Hajiqanbar and Hosseininaveh 2014; Kurosa 1979).

***Unguidispus polyctenus* (Sevastianov, 1969)**
Figs 1–4

Piniphorus polyctenus Sevastianov, 1969, p. 68, fig. 2.
Xystrorostrum polyctenus: Mahunka 1970a: 165.
Unguidispus polyctenus: Mahunka 1970b: 282.

Redescription. Female Length of idiosoma 190–205, width 120–135.

Gnathosoma (Figs 1, 4E, 4F). Gnathosomal capsule beak-like, about 1.5 times longer than its width. Dorsally with two pairs of smooth subequal setae (*cha*, *chb*). Dorsal median apodeme absent. Ventral gnathosoma with one pair of subcapitular setae *m* and a pair of oval pits situated posteromedial to bases of *m*. Palps with setae *dFe* and *dGe* dorsolaterally. Setae *dGe* slightly longer than *dFe*. Ventral palpal structures not evident even on SEM photos (Fig 4F). Palps terminated with a relatively long and thin tibial claw (Fig 4F).

Idiosomal dorsum (Figs 1A, 4A). Prodorsum almost completely covered by anterior margin of tergite C, with one pair of setae sc_2, one pair of clavate and weakly barbed trichobothria sc_1 with pointed apex, and one pair of large round stigmata. All dorsal shields smooth. All dorsal setae distinctly barbed; setae *d* and *f* blunt-ended, other dorsal setae pointed. Posterior margin of tergite C straight; posterior margin of tergite H with tongue-like elongation medially. Cupules *ia* on tergite D and *ih* on tergite H small, round. Lateral shields covering lateral parts of tergite D with distinct sclerotized lines (Fig 4B). With a pair of arch-like structures anteriorly to setae *f* and a pair of oblique ridges connected to bases of setae *e* (Fig 4C). Length of dorsal setae: sc_2 12–14, c_1 35–38, c_2 40–42, *d* 36–38, *e* 44–45, *f* 35–37, h_1 40–45, h_2 35–37. Distances between setae: sc_2–sc_2 37–40, c_1–c_1 47–50, c_1–c_2 22–24, *d*–*d* 41–43, *e*–*f* 18–20, *f*–*f* 35–38, h_1–h_1 19–21, h_1–h_2 18–21.

Idiosomal venter (Figs 1B, 4D). All ventral plates smooth. All ventral setae pointed and barbed, except smooth ps_3. Apodemes 1 (ap1) weakly developed and joined with prosternal apodeme (appr); apodemes 2 (ap2) well developed, arch-like, fused with appr; prosternal and sejugal (apsej) apodemes well developed; apodemes 3 (ap3) well sclerotized. Apodemes 4 (ap4) well sclerotized and long, apodemes 5 absent. Posterior margin of posterior sternal plate slightly convex in middle part. Posterior margin of aggenital plate rounded. Anterior genital sclerite (ags) bell-like, posterior genital sclerite (pgs) very small, triangular. Length of ventral setae: 1*a* 35–37, 1*b* 21–23, 2*a* 33–36, 2*b* 36–40, 3*a* 34–36, 3*b* 35–37, 3*c* 36–38, 4*a* 36–38, 4*b* 52–55, 4*c* 39–41, ps_1 24–26, ps_3 9–11.

Legs (Figs 2–3, 4F). Leg I (Figs 2A, 4F) distinctly shorter and thinner than leg II. Setal formula: 1–3–4–16(4). Tibiotarsus not thickened, with well-developed terminal claw situated on distinct pretarsus, tip of the claw thin. Length of solenidia ω_1 11–12 = ω_2 11–12 > φ_1 6–7 = φ_2 6–7; ω_1 and ω_2 finger-shaped, φ_2 baculiform, φ_1 clavate. Setae (*u*) fused into structure opposing to tarsal claw. Leg II (Fig 2B). Setal formula: 1–3–3–4(1)–6(1). Tarsus with sickle-like, padded claws and large empodium. Solenidion ω 9–10, finger-shaped, solenidion φ 3–4 weakly clavate. Seta *dFe* distinctly blunt-ended. Leg III

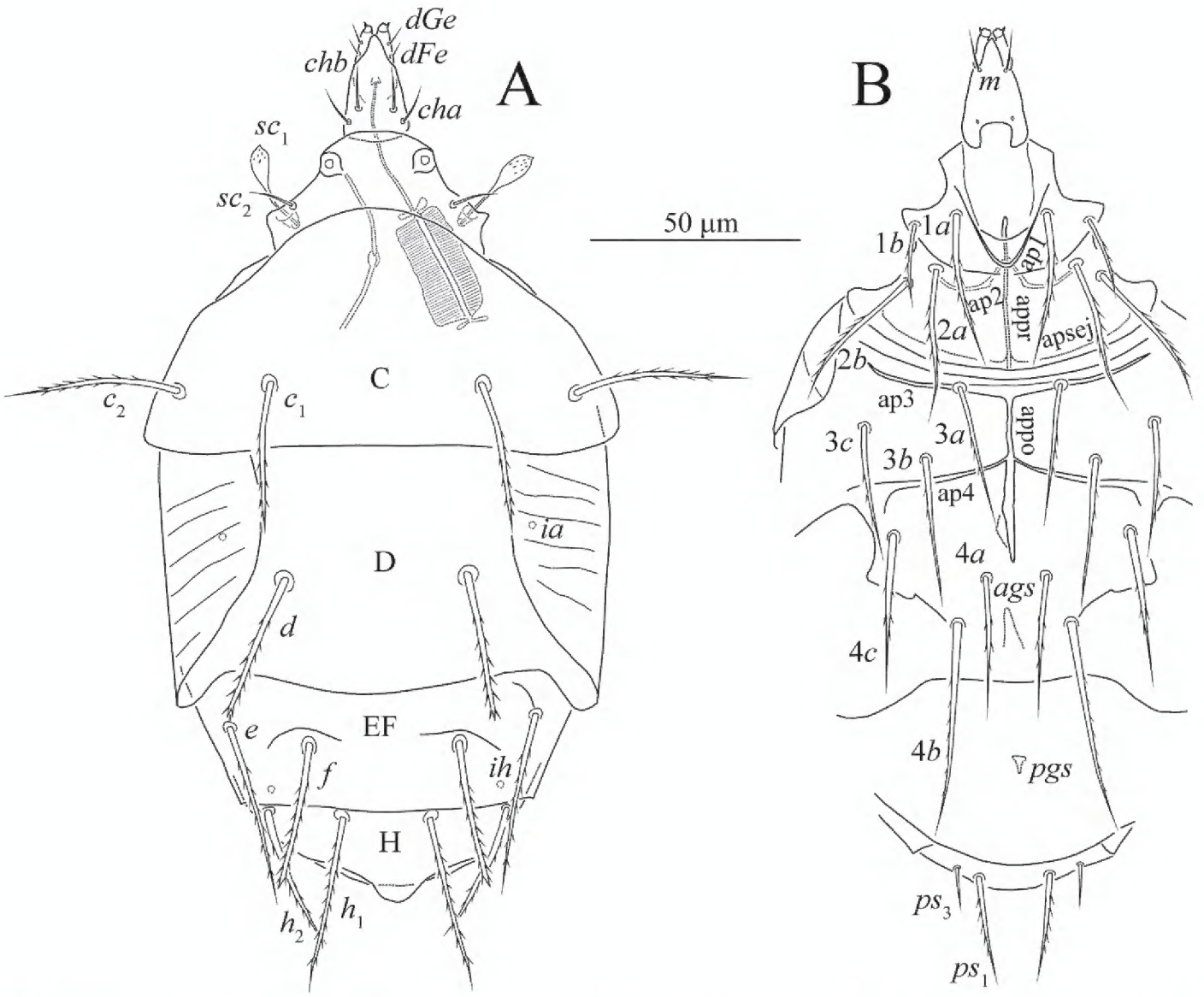

Figure 1. *Unguidispus polyctenus* (Sevastianov, 1969), female: **A** dorsum of the body **B** venter of the body.

(Fig 3A). Setal formula: 1–2–2–4(1)–6. Claws of same shape as on tarsus II. Solenidion φ 3–4 weakly clavate. Seta *dFe* distinctly blunt-ended. Leg IV (Fig 3B). Setal formula: 1–2–1–4(1)–6. Tarsus long and thin, pretarsus short, with two small simple claws and small empodium. Solenidion φ 3–4, weakly clavate. Seta *dFe* distinctly blunt-ended.

Male and **larva** unknown.

Material examined. Eight female paratypes, **UKRAINE**, Khmelnitsk Province, vicinity of settlement Chemerovtsy, on ants *Formica polyctena* Forster, 23 July 1966, coll. V.D. Sevastianov; 3 females, **RUSSIA**: Tyumen Province, vicinity of Tyumen, 57°04'03"N, 65°04'12"E , on ants *Formica rufa* L., 17 August 2014, coll. A.A. Khaustov; 15 females, **RUSSIA**, Tyumen Province, vicinity of Tyumen, 57°13'43.6"N, 65°28'28.4"E, on ants *Formica polyctena*, 14 September 2014, coll. A.A. Khaustov.

Distribution and hosts. This species was described from Western Ukraine from ants *Formica polyctena* Forster (Sevastianov 1969). It was also recorded in northwestern Russia (Sevastianov 1978), Austria (Mahunka 1970b) from ants *Formica rufa* L., and in Hungary from ant nest (Mahunka 1987).

Remarks. Sevastianov (1969) placed this species in the genus *Piniphorus* Sevastianov, 1969. Mahunka (1970a) transferred it to *Xystrorostrum* Mahunka, 1968

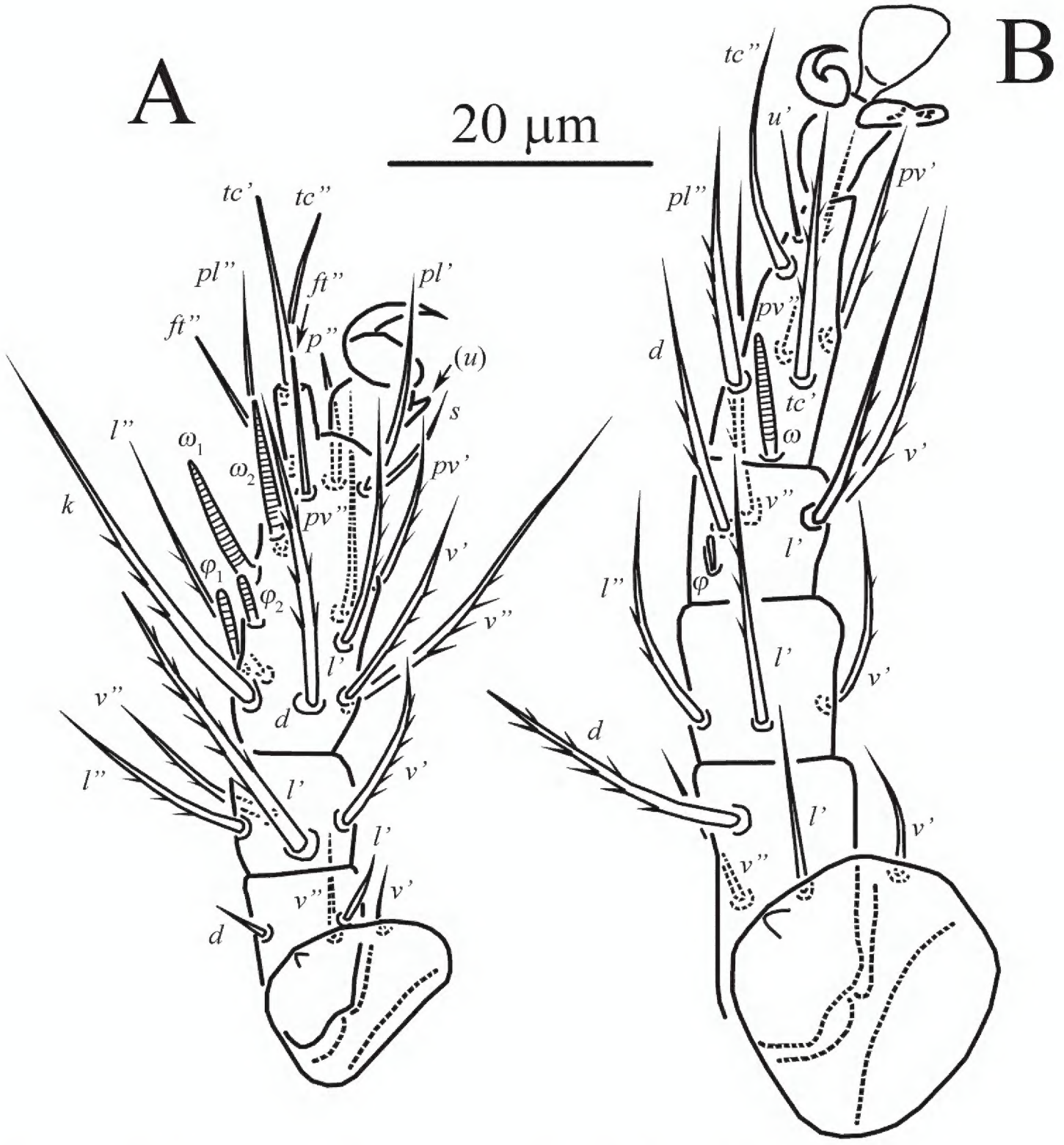

Figure 2. *Unguidispus polyctenus* (Sevastianov, 1969), female: **A** leg I **B** leg II.

(Neopygmephoridae) which he considered as a senior synonym of *Piniphorus*. The same year Mahunka (1970b) moved this species to the microdispid genus *Unguidispus* Mahunka, 1970. In spite of this, Sevastianov (1978) retained it in the neopygmephorid genus *Xystrorostrum*.

The original description of *U. polyctenus* of Sevastianov (1969) is incomplete, thus I made a redescription of this species. The present redescription of *U. polyctenus* is based mainly on material from Western Siberia. The female paratypes available for this study are found in bad condition, yet sufficient to prove their identity with mite specimens from Western Siberia.

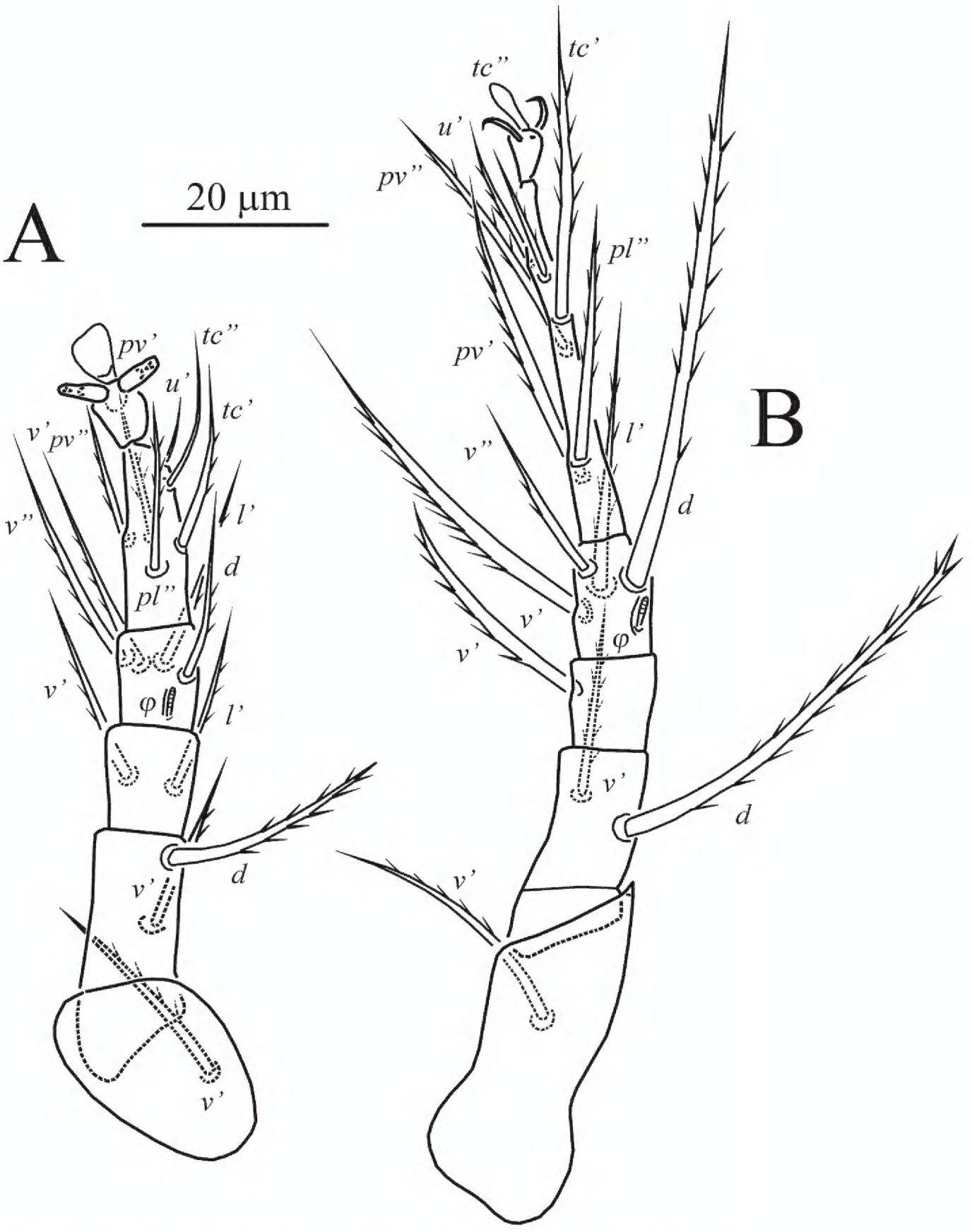

Figure 3. *Unguidispus polyctenus* (Sevastianov, 1969), female: **A** leg III **B** leg IV.

Unguidispus lasii Kurosa, 1979

Unguidispus lasii Kurosa, 1979, p. 66, figs 5–6.

Material examined. Six females, **RUSSIA**: Tyumen Province, vicinity of Tyumen, 57°04'03"N, 65°04'12"E , on ants *Lasius niger* L., 17 August 2014, coll. V.M.

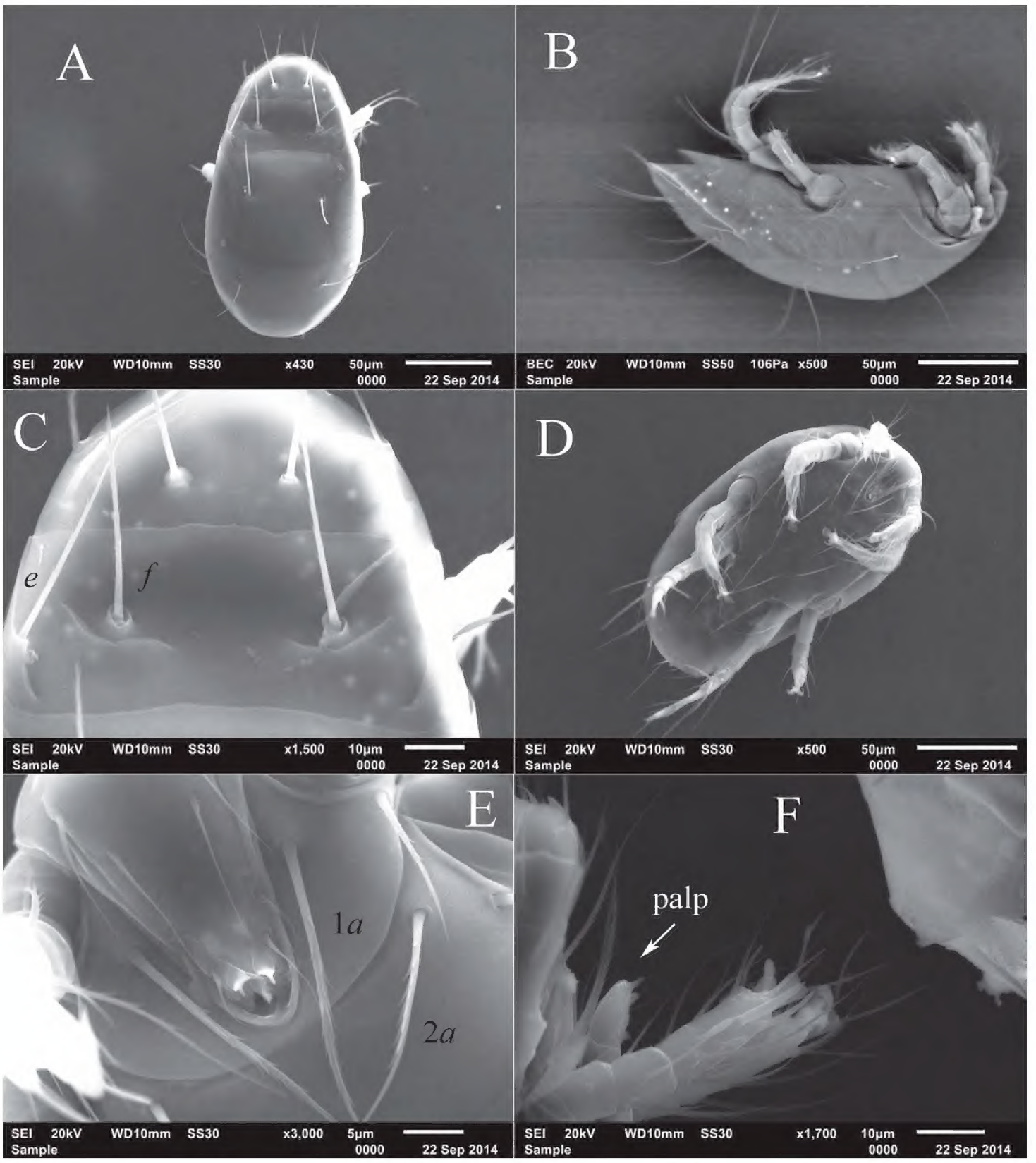

Figure 4. *Unguidispus polyctenus* (Sevastianov, 1969), female, SEM photos: **A** dorsum of the body **B** lateral view of the body **C** tergites EF and H **D** venter of the body **E** gnathosomal capsule **F** legs I and distal part of gnathosoma laterally.

Salavatulin; 5 females, Russia: Tyumen Province, vicinity of Tyumen, 57°09'55"N, 65°27'32"E, on ants *Lasius niger*, 31 August 2014, coll. A.A. Khaustov.

This species was described from Japan where it was found in the nests of ants *Lasius niger* and *L. hayashi* Yamauchi and Hayashida (Kurosa 1979). I recorded phoresy of this species on *Lasius niger* in Western Siberia. This is a new record for the fauna of Russia.

Unguidispus japonicus Kurosa, 1979

Unguidispus japonicus Kurosa, 1979, p. 64, figs 1–2.

Material examined. Five females, **RUSSIA**: Tyumen Province, vicinity of Tyumen, 57°04'03"N, 65°04'12"E, on ants *Lasius niger*, 17 August 2014, coll. V.M. Salavatulin. 2 females, **RUSSIA**: Tyumen Province, vicinity of Tyumen, 57°09'55"N, 65°27'32"E, on ants *Lasius niger*, 31 August 2014, coll. A.A. Khaustov.

This species was described from Japan from the nests of ants *Lasius niger* (Kurosa 1979). I recorded phoresy of this species on *Lasius niger* in Western Siberia. This is a new record for the fauna of Russia.

Key to world species of the genus *Unguidispus* (females)

1 All dorsal hysterosomal setae unmodified **2**
– At least setae on tergites C and D flattened, widened distally, and heavily barbed **3**
2 Setae c_1, *d*, and *f* thin and smooth, without arch-like ridges anteriorly to setae *f* ..... ***U. okumurai* Kurosa, 1979**. Japan. On *Lasius hayashi*
– All dorsal hysterosomal setae strongly barbed, with arch-like ridges anteriorly to setae *f* ..... ***U. polyctenus* (Sevastianov, 1969)**. Ukraine, Austria, Hungary, Russia. On *Formica rufa*, *F. polyctena*
3 Setae h_1 flattened, widened distally and barbed **4**
– Setae h_1 thin, smooth, pointed ..... ***U. contematosus* Sevastianov, 1981**. Ukraine. On *Lasius fuliginosus*
4 Setae *e* distinctly thickened, subequal to or longer than *f* **5**
– Setae *e* not thickened, distinctly shorter than *f* ..... ***U. lasii* Kurosa, 1979**. Japan, Russia. On *Lasius niger*, *L. hayashi*
5 Setae h_2 pointed, setae *d* distinctly thicker than *f*, trichobothria spherical ..... ***U. japonicas* Kurosa, 1979**. Japan, Russia. On *Lasius niger*
– Setae h_2 widened distally, setae *d* as thick as *f*, trichobothria pointed distally ..... ***U. stammeri* Mahunka, 1970**. Hungary. In ant nest.

Genus *Caesarodispus* Mahunka, 1977

Type species. *Caesarodispus gaius* Mahunka, 1977, by original designation.

Diagnosis. Female. Gnathosoma dorsally with two pairs of setae. Pharyngeal pumps 1 and 3 vestigial, pharyngeal pump 2 large, transversely striated. Prodorsum usually almost completely covered by tergite C. Cupules *ia* and *ih* small, usually round. Two pairs of pseudanal setae (ps_2 absent). Posterior margin of posterior sternal plate entire. Leg I distinctly shorter than leg II. Tibiotarsus without claw; pinnaculum

absent; setae *s* of tibiotarsus I present. Trochanter IV anterodorsally without spine-like process.

The genus *Caesarodispus* currently includes nine species distributed in the Holarctic region: *C. gaius*, *C. samsinaki* (Mahunka, 1967), comb. n., *C. minutus* (Sevastianov, 1981), *C. acuminatus* (Sevastianov, 1981), *C. klepzigi* Khaustov & Moser, 2008, *C. pusillus* Khaustov, 2009, *C. brevipes* Mahunka, 1986, *C. modestus* (Berlese, 1903), and *C. shandizensis* Loghmani & Hajiqanbar, 2014. All species of the genus *Caesarodispus* phoretic on various ants, or inhabit their nests. Loghmani et al. (2014) discussed distribution and host specificity of the genus *Caesarodispus* and provided key to eight species.

***Caesarodispus samsinaki* (Mahunka, 1967), comb. n.**
Figs 5–7

Pygmephorus samsinaki Mahunka, 1967, p. 241, fig. 1.
Brennandania samsinaki: Mahunka 1972: 82.
Petalomium samsinaki: Sevastianov 1978: 37.

Redescription. Female. Length of idiosoma 220, width 135. *Gnathosoma* (Figs 5–6). Gnathosomal capsule about as long as its width. Dorsally with two pairs of smooth setae (*cha*, *chb*). Setae *cha* slightly longer than *chb*. Dorsal median apodeme absent. Ventral gnathosoma with one pair of subcapitular setae *m* and a pair of oval pits situated posteromedial to bases of *m*. Palps short, with setae *dFe* and *dGe* dorsolaterally. Setae *dGe* slightly longer than *dFe*. Ventrally with tiny solenidion and accessory setigenous structure. Palps terminated with a relatively short and thick tibial claw. Palpal tibiotarsus laterally with small triangular translucent process. Pharyngeal pumps 1 and 3 small, vestigial; pharyngeal pumps II large, transversely striated (Fig. 5A).

Idiosomal dorsum (Fig 5A). Tergite C covering only posterior part of prodorsum, which bears one pair of setae sc_2, one pair of spherical and weakly barbed trichobothria sc_1 and one pair of oval stigmata. Prodorsal shield with sparsely distributed small dimples. All hysterosomal tergites distinctly reticulated and with sparsely distributed small dimples. All dorsal setae lanceolate, sparsely barbed. Posterior margin of tergite C straight; posterior margin of tergite H with tongue-like elongation medially. Cupules *ia* on tergite D and *ih* on tergite H very small, round. Length of dorsal setae: sc_2 32, c_1 42, c_2 44, *d* 58, *e* 47, *f* 50, h_1 54, h_2 46. Distances between setae: sc_2–sc_2 43, c_1–c_1 35, c_1–c_2 24, *d*–*d* 31, *e*–*f* 25, *f*–*f* 30, h_1–h_1 29, h_1–h_2 19.

Idiosomal venter (Fig 5B). All ventral plates with small dimples. Posterior part of posterior sternal plate and aggenital plate reticulated. All ventral setae pointed and barbed. Ap1 well-developed and joined with appr; ap2 thin, arch-like, fused with appr; appr and apsej well developed; ap3 indistinct. Ap4 well sclerotized and long, apodemes 5 absent. Posterior margin of posterior sternal plate slightly convex in middle part. Posterior margin of aggenital plate rounded. Ags bell-like, pgs elongate, subtriangular.

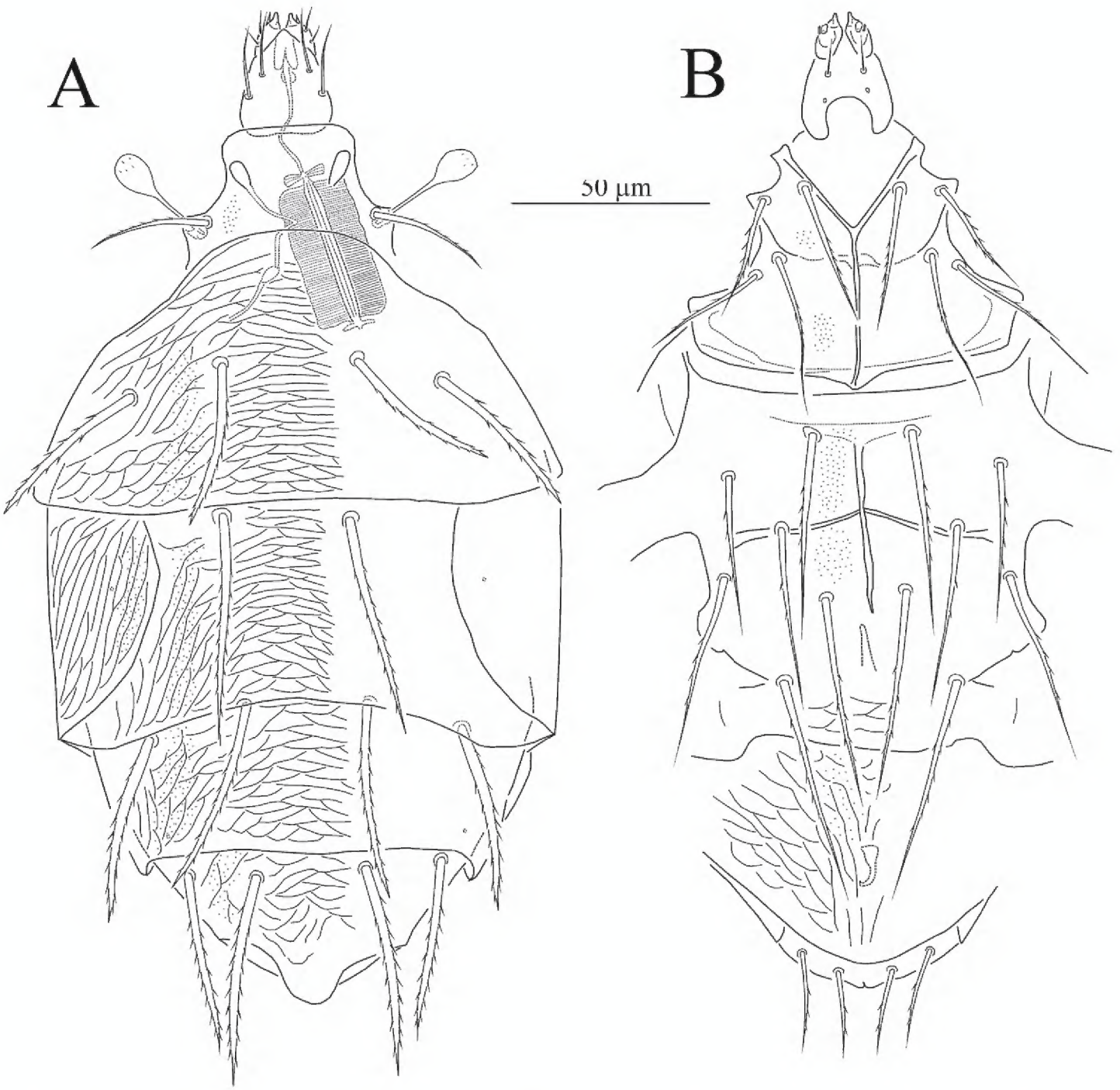

Figure 5. *Caesarodispus samsinaki* (Mahunka, 1967), comb. n., female: **A** dorsum of the body **B** venter of the body.

Length of ventral setae: 1*a* 35, 1*b* 32, 2*a* 42, 2*b* 39, 3*a* 52, 3*b* 47, 3*c* 40, 4*a* 54, 4*b* 60, 4*c* 47, ps_1 23, ps_3 24.

Legs (Figs 6–7). Leg I (Fig 6A) distinctly shorter and thinner than leg II. Setal formula: 1–3–4–16(3). Tibiotarsus not thickened, cylindrical. Length of solenidia ω_1 11 > φ_1 5 < φ_2 10; ω_1 and φ_2 finger-shaped, φ_1 clavate, solenidion ω_2 absent. Seta *k* very long, slightly longer than combined genu and tibiotarsus I. Leg II (Fig 6B). Setal formula: 1–2–3–4(1)–6(1). Tarsus with sickle-like, padded claws and large empodium. Solenidion ω 8, finger-shaped, solenidion φ 4 weakly clavate. Setae *v"* of femur II absent. Leg III (Fig 7A). Setal formula: 1–2–2–4(1)–6. Claws of same shape as on tarsus II. Solenidion φ 4 weakly clavate. Seta *dFe* blunt-ended. Leg IV (Fig 7B). Setal formula: 1–2–1–4(1)–6. Tarsus long and thin, pretarsus short, with two small simple claws and small empodium. Solenidion φ 4, weakly clavate. Seta *dFe* distinctly blunt-ended.

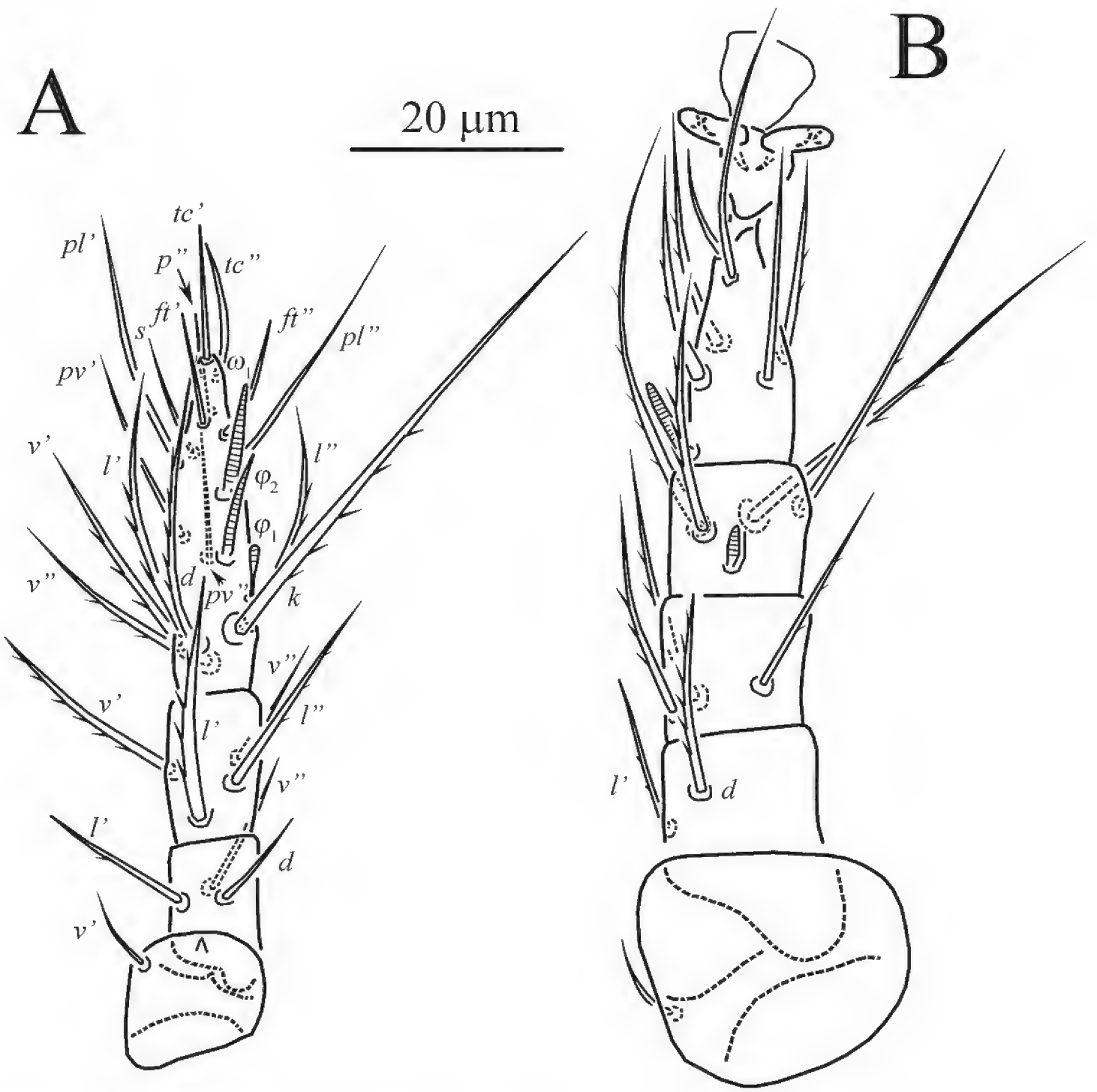

Figure 6. *Caesarodispus samsinaki* (Mahunka, 1967), comb. n., female: **A** leg I **B** leg II.

Male and **larva** unknown.

Material examined. One female, **RUSSIA**: Tyumen Province, vicinity of Tyumen, 57°04'03"N, 65°04'12"E , on ants *Formica rufa* L., 17 August 2014, coll. A.A. Khaustov.

Distribution and hosts. This species was originally described from the Czech Republic (Mahunka 1967) where it was collected from ants *Formica rufa*. It was also recorded from Ukraine and Belarus (Sevastianov 1978). This is a new record for the fauna of Russia.

Remarks. Mahunka (1967) described this species in the genus *Pygmephorus* Kramer (Pygmephoridae). Later on, he replaced it to the genus *Brennandania* Sasa, 1961 (Microdispidae) (Mahunka 1972). Sevastianov (1978) placed this species in the genus *Petalomium* Cross, 1965 (Neopygmephoridae).

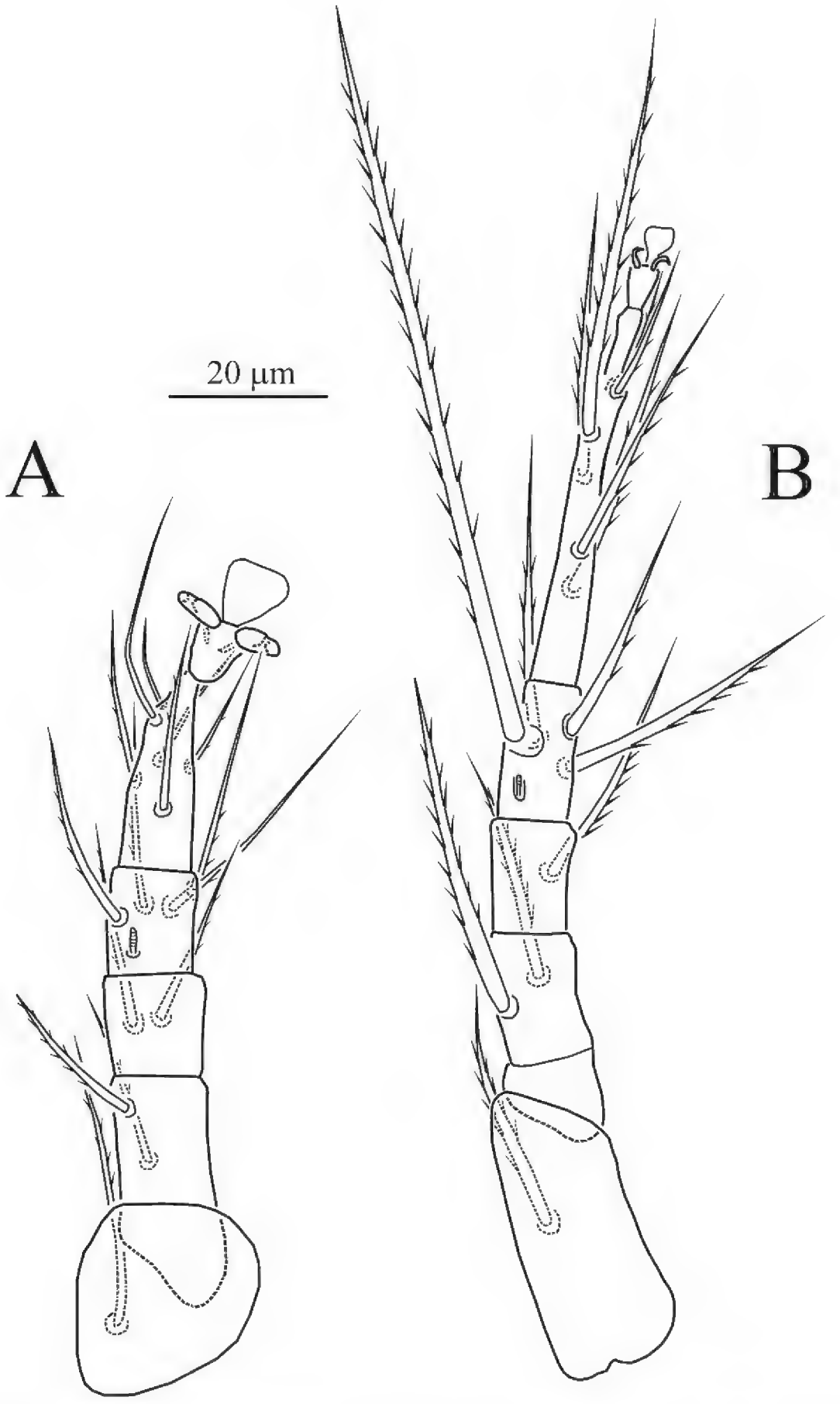

Figure 7. *Caesarodispus samsinaki* (Mahunka, 1967), comb. n., female: **A** leg III **B** leg IV.

According to key to families of the superfamily Pygmephoroidea provided by Khaustov and Ermilov (2011) this species undoubtedly belongs to the family Microdispidae by having three setae on femur I, unmodified seta *dFeI* and presence of only one pair of setae on prodorsum. I placed this species in the genus *Caesarodispus* based on the following combination of characters: 1) tibiotarsus I without claw, 2) leg I distinctly shorter and thinner than leg II, 3) seta *s* of tibiotarsus I present, 4) pharyngeal

pumps 1 and 3 vestigial, pharyngeal pump 2 large, distinctly transversely striated, 5) posterior margin of posterior sternal plate entire. All of these characters well agree with diagnosis of the genus *Caesarodispus*.

Unlike other known species of the genus *Caesarodispus*, *C. samsinaki* has only two setae on femur II (*v"* absent) and only three solenidia on tibiotarsus I (ω_2 absent). However reduction of leg chaetotaxy was also recorded in C. *klepzigi* Khaustov and Moser, 2008, which has only two setae on femur I, while other *Caesarodispus* species have three setae.

The original description of *C. samsinaki* of Mahunka (1967) is incomplete, thus I made a redescription of this species. The present redescription of *C. samsinaki* is based on material from Western Siberia. The specimens from Western Siberia are well agreed with original description of *C. samsinaki*, especially having lanceolate dorsal idiosomal setae and unique reticulated hysterosomal tergites, and undoubtedly conspecific with it.

***Caesarodispus minutus* (Sevastianov, 1981)**

Microdispus minutus Sevastianov, 1981, p. 28, fig. 5.
Caesarodispus minutus: Khaustov 2008: 390.

Material examined. Eleven females, Russia: Tyumen Province, Tyumen region, vicinity of settlement Narimanovo, 57°21'56"N, 65°08'21"E, in the nest of ants *Lasius flavus* (Fabricius), 30 July 2014, coll. V.A. Stolbov.

This species was described from Ukraine from ants *Tetramorium caespitum* L. (Sevastianov 1981). Khaustov (2009) redescribed it based on type material. It was also recorded from Iran from *Temnothorax* sp. (Loghmani et al 2014). This is a new record for the fauna of Russia.

Key to world species of the genus *Caesarodispus* (females)

1 Hysterosomal tergites not reticulated, femur II with three setae **2**

– Hysterosomal tergites distinctly reticulated, femur II with two setae (*v"* absent) ..... ***C. samsinaki* (Mahunka, 1967), comb. n.** Czech Republic, Ukraine, Belarus, Russia. On *Formica rufa*.

2 Seta *v'* of genu I not thickened, pointed **3**

– Seta *v'* of genu I distinctly thickened, widened distally, strongly barbed ..... ***C. pusillus* Khaustov, 2009**. Crimea. In the nest of *Crematogaster schmidti*

3 Seta *d* no more than 1.5 times longer than *f* **4**

– Seta *d* about 4 times longer than *f* ..... ***C. klepzigi* Khaustov & Moser, 2008**. U.S.A. On *Solenopsis invicta*

4 Seta *d* of tibia IV heavily barbed, reaching beyond tip of pretarsus IV **5**

– Seta *d* of tibia IV smooth or weakly barbed, not reaching beyond tip of pretarsus IV 7

5 Seta *d* of femur IV subequal to or longer than *tc"* of tarsus IV **6**
– Seta *d* of femur IV more than 2 times shorter than *tc"* of tarsus IV .....
..... ***C. gaius*** **Mahunka, 1977**. France. On *Myrmica sabuleti*
6 Setae *d* and *f* lanceolate and strongly barbed .....
..... ***C. brevipes*** **Mahunka, 1986**. Hungary. In ant nest
– Setae *d* and *f* not lanceolate, weakly barbed.....
..... ***C. modestus*** **(Berlese, 1903)**. Italy, Russia (Crimea). On *Messor* spp.
7 Posterior part of aggenital plate smooth **8**
– Posterior part of aggenital plate distinctly reticulated .....
..... ***C. shandizensis*** **Loghmani & Hajiqanbar, 2014**. Iran. On *Temnothorax* sp.
8 Setae *f* distinctly longer than distance *f–f*..... ***C. minutus*** **(Sevastianov, 1981)**. Ukraine, Iran, Russia. On *Tetramorium caespitum*, *Lasius flavus*, *Temnothorax* sp.
– Setae *f* shorter than distance *f–f*.....
.... ***C. acuminatus*** **(Sevastianov, 1981)**. Ukraine. On *Tetramorium caespitum*

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